

# Chapter 7. Transportation Modes

As a multimodal long-range transportation plan, MoveAZ addresses six modes of personal travel in Arizona: highway, rail, transit, air, bicycling, and pedestrian. It also addresses four modes of freight and commodity movement: truck, rail, air, and pipeline. This chapter presents the following basic data for the six passenger modes:

- The extent of the mode in Arizona, including location of facilities, types of systems, and other pertinent information;
- The demand for travel or utilization of the mode; and
- The role of ADOT in providing funding, operations, research, and other support for the mode.

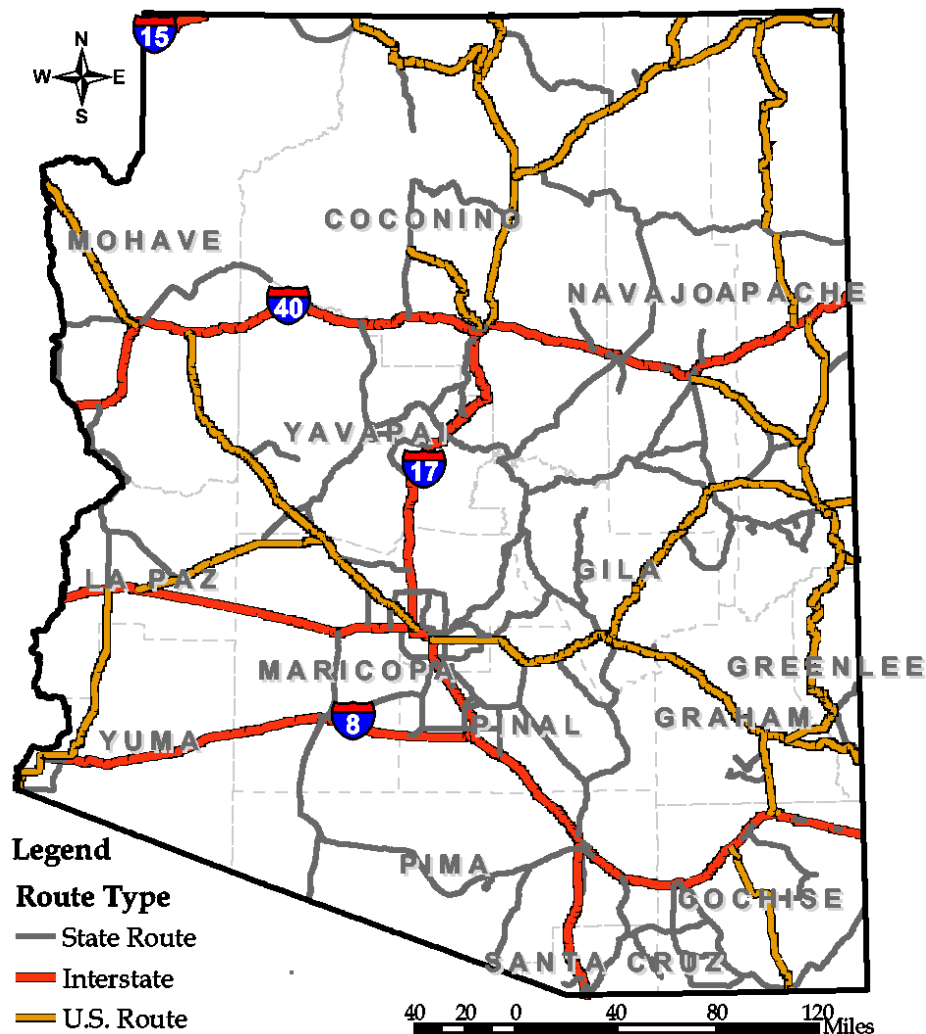
Chapter 8 provides similar information for freight modes in the context of the integrated transportation system.

## ■ 7.1 Highways

### Extent of the Highway System

The Arizona highway system consists of over 58,000 miles of roadway, of which two percent are interstates, three percent are U.S. routes, and nearly six percent are state routes. Although only 12 percent of the total highway network are state facilities, over 57 percent of the daily VMT occur on these roads. The Interstate System – which is part of the state highway system – carries 28 percent of all daily VMT.

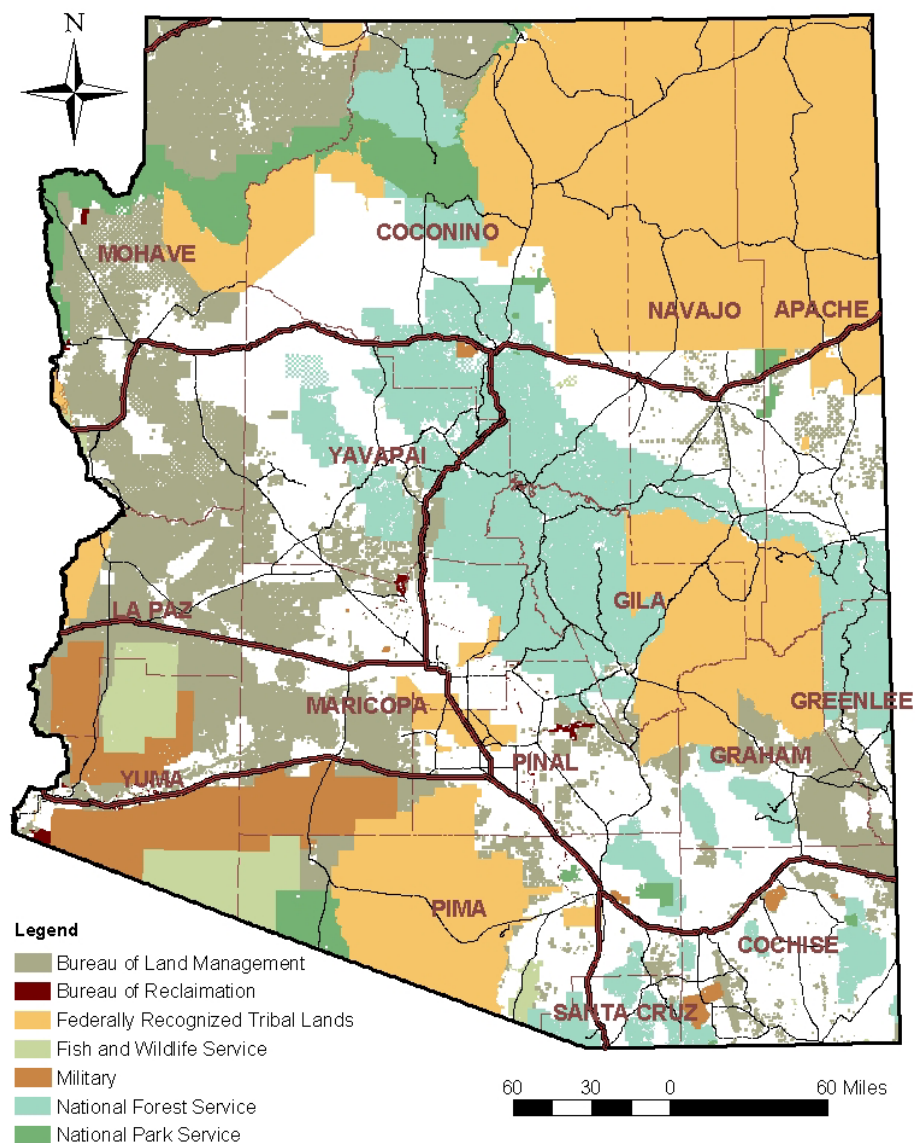
**Figure 7.1 Arizona State Highway System by Route Type**



### *Federal and Tribal Lands*

Much of the Arizona State Highway System passes through lands owned by Federal agencies and Federally-recognized tribes. Federal agencies and Federally-recognized tribes own 70 percent of the land in Arizona. Federal lands agencies, including the U.S. Forest Service, the Bureau of Land Management, and others, own 42 percent of the land in Arizona, with over 2,000 miles of state highway passing through these lands. Arizona's 21 Federally-recognized tribal nations own 28 percent of Arizona land. An additional 1,200 miles of state highway pass through these lands, with over one-half of these road-miles in the Navajo Nation. The Navajo Nation is the largest tribal reservation in the State, covering nearly 16,000 square miles in Arizona and extending into Utah, New Mexico, and Colorado. Arizona's Federal and tribal lands and their relationship to the state highway network are shown in Figure 7.2.

**Figure 7.2 Federal and Tribal Land Ownership**



### *Intelligent Transportation Systems*

Intelligent Transportation Systems (ITS) refers to a set of strategies that can improve the management of roadway operations, and provide additional capacity and efficiency of state roads at reduced cost. ITS solutions and strategies often provide safety and law enforcement benefits as well. ITS is extensively used throughout Arizona, particularly in the Phoenix and Tucson metropolitan areas.

In the Phoenix-Mesa metropolitan area, ADOT operates 50 miles of freeway management system on eight corridors, including vehicle detection stations, variable message signs, closed-circuit television cameras, and a 24-hour traffic operations center. Information

collected through the ITS infrastructure is shared with the public via radio, telephone, Internet, and public kiosks operated as part of the AZTech™ public-private partnership. Several jurisdictions in the Phoenix-Mesa metropolitan area, including the Maricopa County DOT and the Cities of Phoenix, Chandler, Gilbert, Glendale, Mesa, Peoria, Scottsdale, and Tempe, have implemented ITS infrastructure, including synchronized signalization and signal preemption for emergency vehicles.

ADOT also provides incident management through its Arizona Local Emergency Response Team (ALERT). The Road Closure and Restriction System allows the reporting of conditions on arterial streets. Local, county, and state government agencies involved in traffic management and emergency response share information through operations centers and the AZTech™ partnership.

In the Tucson metropolitan area, three components of the ITS infrastructure provide service to highways: the Arterial Traffic Management System, the Freeway Management System, and the Regional Traveler Information Center. The City of Tucson's Traffic Control Center uses video detection cameras to coordinate signals and operate the Arterial Traffic and Freeway Management Systems. The Regional Traveler Information Center gathers roadway conditions information into a central clearing house for dissemination to the public.

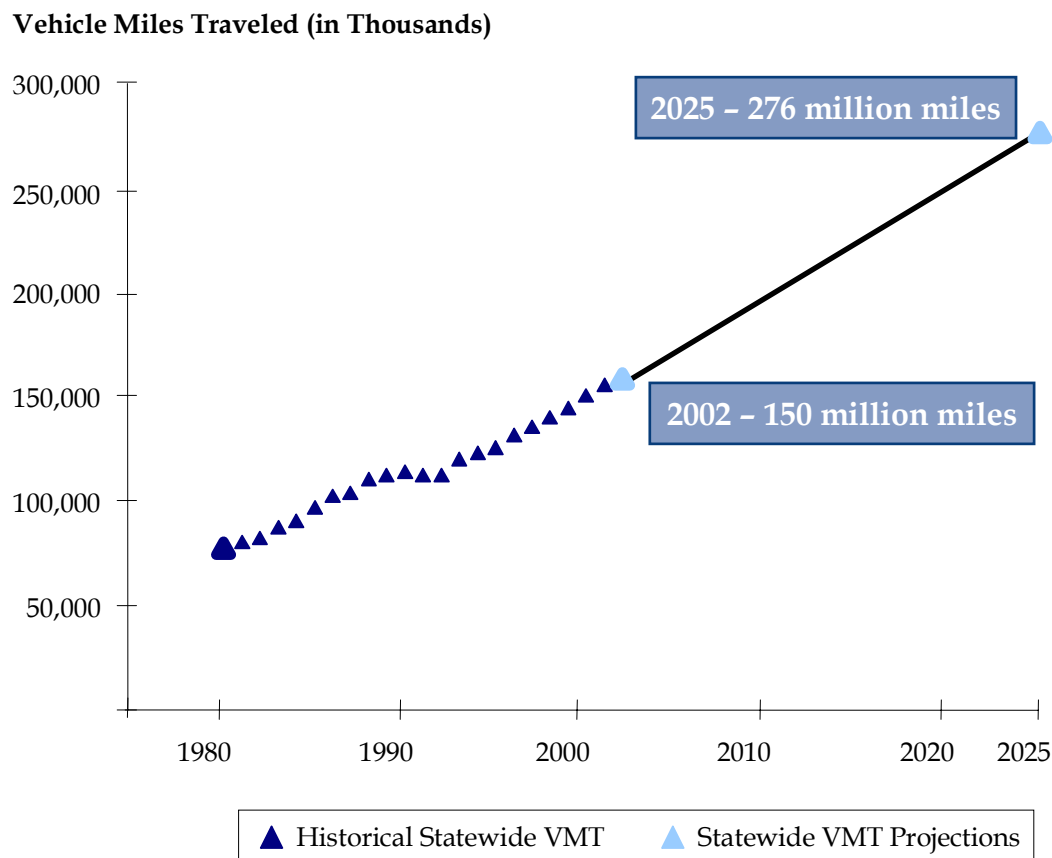
ITS infrastructure for transit has also been implemented in both the Phoenix and Tucson metropolitan areas. Those technologies are described in the transit section of this chapter.

## **Demand for Roadway Travel**

Of all the components of Arizona's transportation system, the road network (including state and local roads) is the largest and most extensively used. Most residents and visitors travel these roads by private automobile. MoveAZ included a process to estimate and forecast total highway travel in Arizona. As described in Chapter 4, the estimate and forecast were used to support the performance analysis of specific transportation projects. Two sources were used for the estimate and forecast:

1. For urbanized areas of the State (Phoenix, Tucson, Yuma, and Flagstaff metropolitan areas), regional travel demand models provided traffic estimates and forecasts; and
2. For the remaining counties or portions of counties not covered by these models, VMT was estimated and forecast using projections of population and employment in the county.

As shown in Figure 7.3, approximately 150 million vehicle miles were traveled on Arizona's state and local roads in 2002. This total is projected to grow to 276 million vehicle miles in 2025.

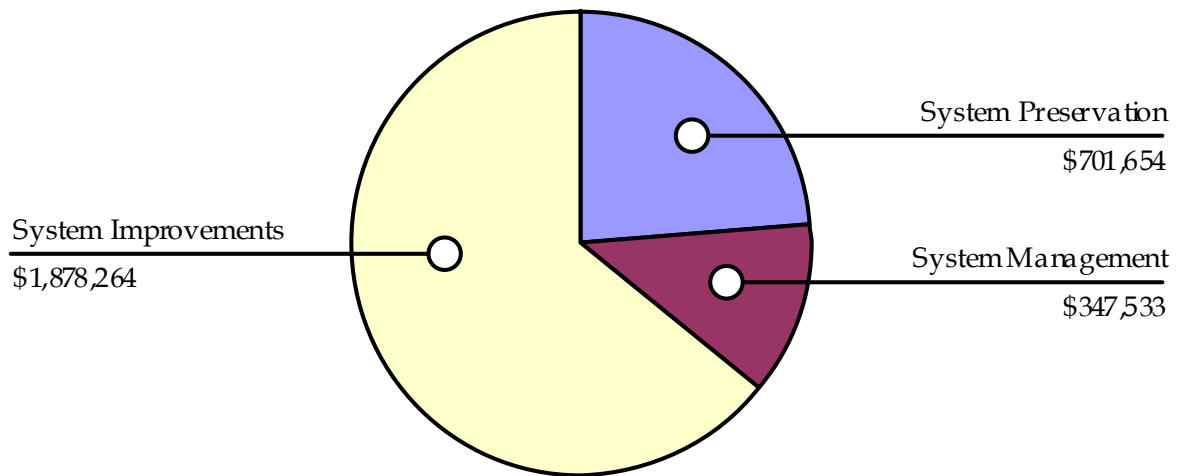
**Figure 7.3 Historical and Projected VMT in Arizona**

Source: Cambridge Systematics, Inc., and Lima and Associates, 2003.

## ADOT's Role in Highway Transportation

The MoveAZ Plan deals extensively with the highway system. ADOT is responsible for developing and maintaining this system, and works with regional and local jurisdictions across the State to identify needs and the projects to address them.

Each year, ADOT updates the *Five-Year Transportation Facilities Construction Program* that identifies all of the projects that ADOT will build on the state transportation system over the next five years. In the 2004 to 2008 five-year program, ADOT will invest close to \$3 billion in total in all facilities (Figure 7.4). Over \$700 million will be invested in system preservation activities, such as pavement maintenance, bridge maintenance, and safety projects over this timeframe. Nearly 350,000 will be invested in system management activities, such as operating support and contingency funding. An additional \$1.9 billion will be invested in system improvements, such as roadway widening, new interchanges, and other capital expansion projects.

**Figure 7.4 ADOT Five-Year Program Investments, 2004 to 2008**

## ■ 7.2 Railroads

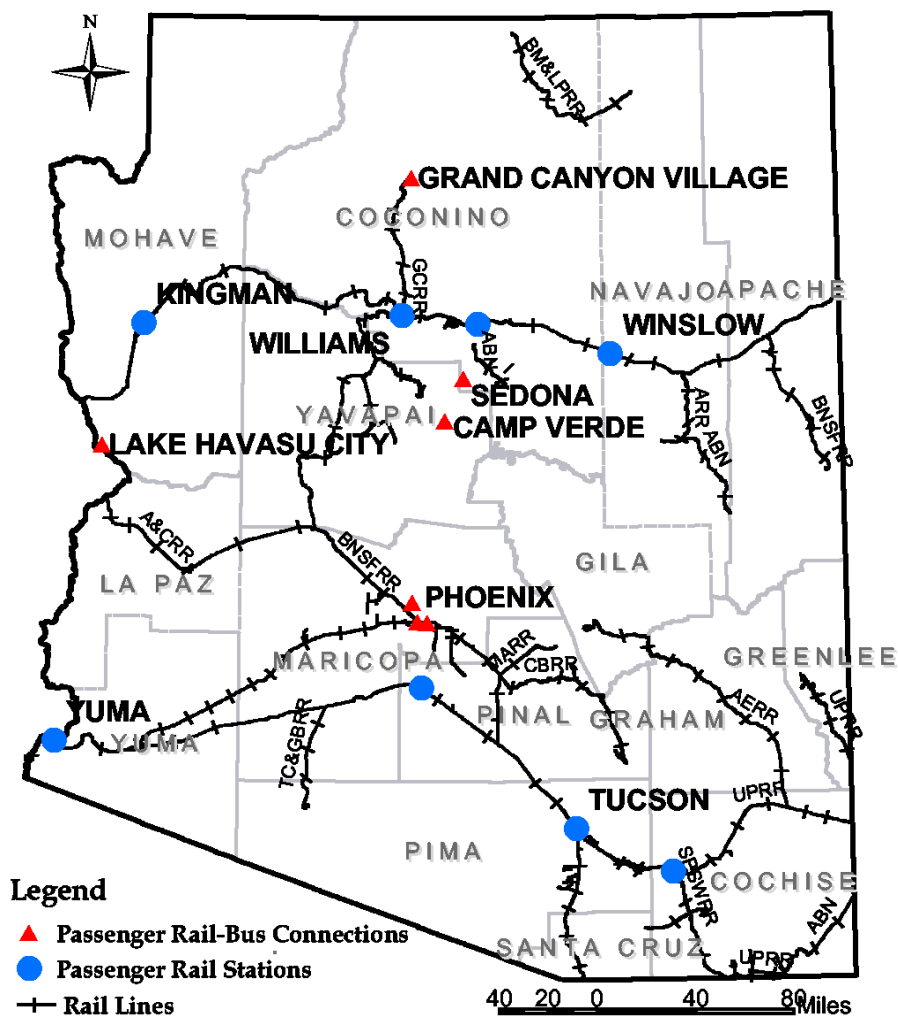
### Extent of Arizona's Rail System

As shown in Figure 7.5, there are 2,654 miles of railroad track in Arizona, including mainline, spurs, and yards. Railroads operate 1,909 route-miles of track in the State, primarily for freight movement (described in Chapter 8). Two freight railroad operators, the Union Pacific (UP) and the Burlington Northern-Santa Fe (BNSF), own 70 percent of the track-miles, while small local railways or the Federal government own the rest. There are 1,639 highway-rail crossings in the State of Arizona, 940 public and 692 private.

### Passenger Rail Utilization and Demand

Amtrak provides three intercity rail services: the Southwest Chief, the Sunset Limited, and the Texas Eagle. The first of these services provides daily stops in Winslow, Flagstaff, Williams, and Kingman. The latter two each provide service three days per week, with stops in Benson, Tucson, Maricopa, and Yuma. The Grand Canyon Railway and Resort operates one round trip per day between Williams and Grand Canyon National Park. Annual rail passenger boardings at passenger stations in Arizona are shown in Table 7.1. Current year (2002) and future forecasts (2025) of intercity rail utilization were generated using population and employment estimates and projections (Table 7.2).

Figure 7.5 Railway Network in Arizona



**Table 7.1 Annual Passenger Rail Counts in Arizona, 2000**

<b>Railway</b>	<b>Station</b>	<b>Boardings</b>
Sunset Limited & Texas Eagle (UP)	Benson	1,900
	Tucson	25,700
	Yuma	2,500
	Phoenix (connecting bus service)	7,950
Southwest Chief (BNSF)	Flagstaff	44,900
	Williams	5,000
	Kingman	3,100
	Winslow	2,200
	Grand Canyon (connecting bus service)	400
	Phoenix (connecting bus service)	450
Grand Canyon Railroad	Grand Canyon	19,000
Arizona Central Railway	Clarkdale	7,200
<b>Total</b>		<b>120,300</b>

Source: Arizona Department of Transportation, 2000.

**Table 7.2 Estimated Daily Intercity Rail Boardings for 2002 and 2025**

<b>County</b>	<b>2002</b>	<b>2025</b>
Maricopa	24	39
Mohave	9	15
Pima	73	105
Navajo	6	9
Cochise	5	8
Coconino	146	222
Yuma	7	11
<b>Total</b>	<b>270</b>	<b>409</b>

Source: Cambridge Systematics, Inc., 2003.



Higher-speed passenger rail service has been a subject of considerable discussion in Arizona. In 1998, ADOT completed a *High-Speed Rail Feasibility Study* for high-speed passenger rail service in the Phoenix-Tucson corridor. A system capable of operating at an average speed of 120 miles per hour was estimated to attract 3.2 million annual passengers in the year 2020, with a capital construction cost of \$3.8 billion. By comparison, similar capacity could be added in the Phoenix-Tucson corridor by widening I-10 from a four- to a six-lane facility. According to ADOT's 1999 *Phoenix to Tucson Multimodal Corridor Profile Study*, this would cost between \$300 million and \$400 million, and would provide sufficient capacity for at least four million additional automobile trips each year.

## **ADOT's Role in Rail Transportation**

ADOT does not build or operate rail systems in Arizona. Across the United States, very few state DOTs own or operate rail systems. Tracks are typically owned by freight rail operators; and passenger rail systems, such as Amtrak, pay to use the track. ADOT provides support to the rail system by sponsoring key studies, such as the high-speed rail feasibility study described above and studies of goods movement, of which rail is a key component. ADOT's Regional Transportation Profiles and other studies will continue to support the evaluation of rail alternatives to improve mobility, reduce congestion and emissions on the state highway system, and provide transportation options to Arizonans. ADOT evaluates the preservation of abandoned rail right of way for possible future uses, including restored rail service and bicycle or mixed-use trails. In addition, ADOT examines the need to improve and/or upgrade highway grade crossings at key locations where safety concerns exist.

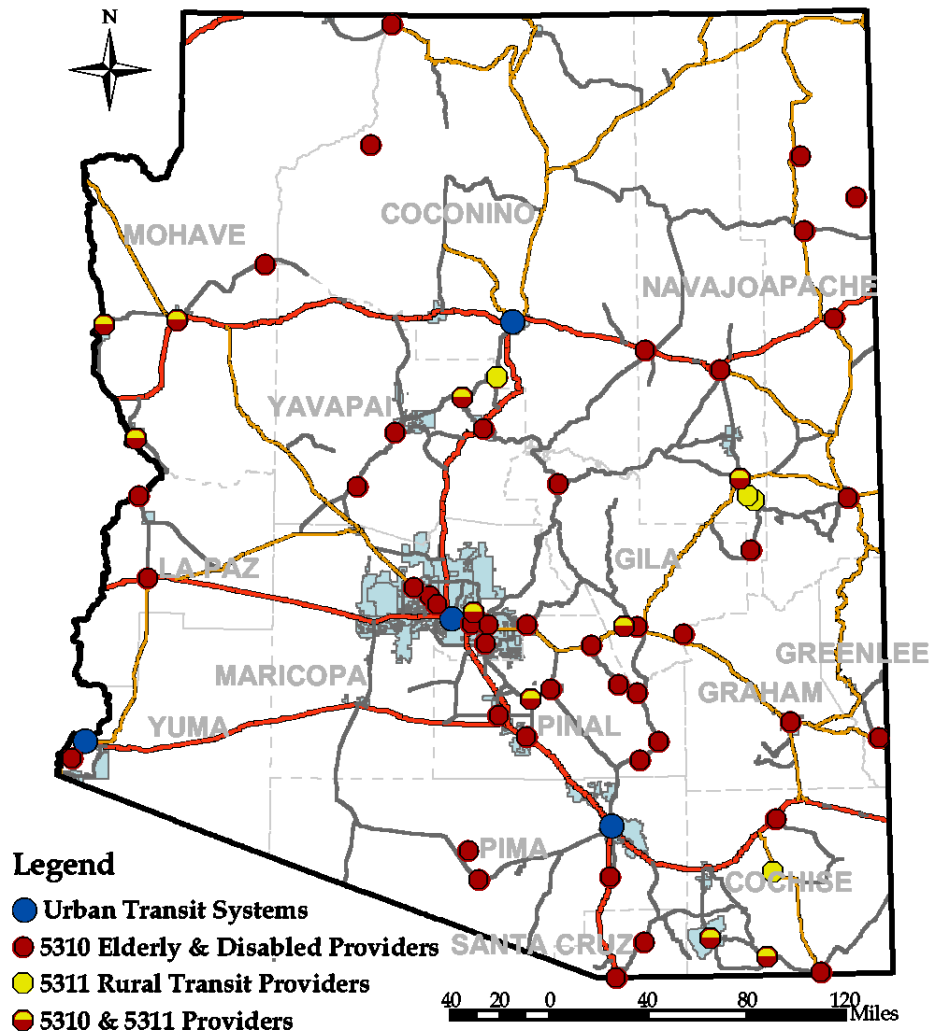
More detail on the freight rail transportation system is provided in Chapter 8.

## ■ **7.3 Transit**

### **Extent of Arizona's Transit Systems**

Although the majority of passenger travel in Arizona takes place by private automobile, public transportation provides an important mobility alternative for those who cannot or choose not to drive or do not have access to an automobile. Arizona is served by a variety of local, regional, and intercity public transportation services that connect homes with jobs, schools, shopping centers, medical complexes, and other destinations (i.e., purposes not dissimilar to those traditionally provided by the private automobile trip). In addition to these general services, Arizona has numerous services for "transit-dependent" populations, such as the elderly, disabled, and economically disadvantaged. Communities that had the following three types of transit services are shown in Figure 7.6:

Figure 7.6 Transit Services in Arizona



Source: Arizona Department of Transportation, and Cambridge Systematics, Inc., 2004.

1. Urban transit systems;
2. Rural transit systems funded by the Federal 5311 program; and
3. Transit systems for special needs populations (elderly and disabled) funded by the Federal 5310 program.

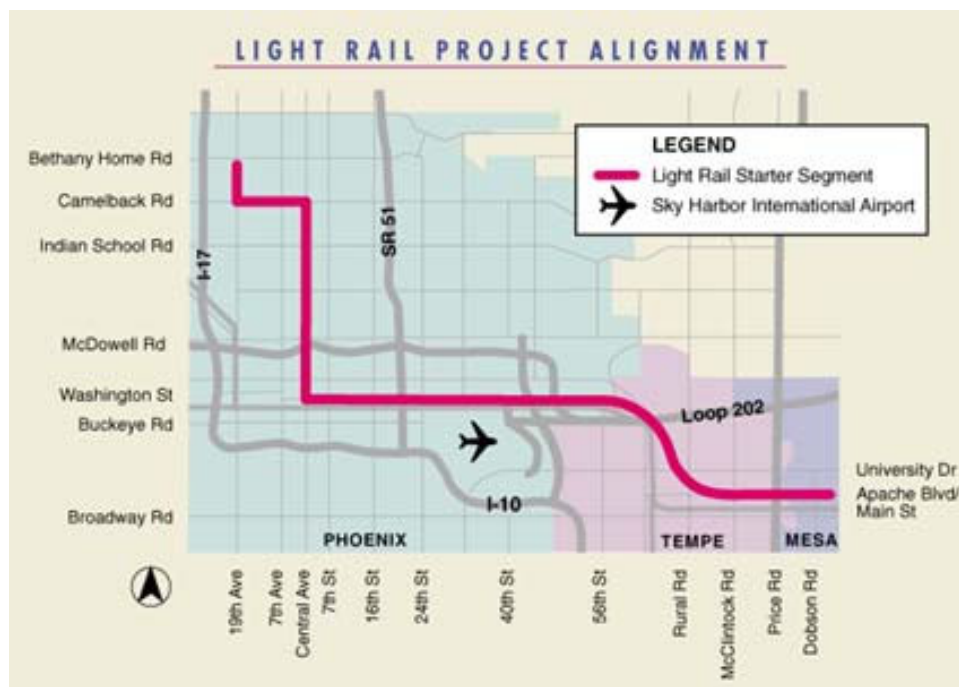
### *Local and Regional Urban Transit*

As shown in Figure 7.6, Arizona has urban public transportation systems in four metropolitan areas with populations over 50,000: Phoenix, Tucson, Flagstaff, and Yuma. The

Prescott region, which was declared the Central Yavapai Metropolitan Area following the 2000 Census, currently does not operate an urban transportation system.

In the Phoenix metropolitan area, Maricopa County and the Cities of Phoenix, Mesa, Tempe, Scottsdale, Chandler, Peoria, Gilbert, Glendale, Avondale, and El Mirage have formed the Regional Public Transportation Authority (RPTA) to provide a unified structure for transit services operating under the Valley Metro brand. The Valley Metro system includes 60 fixed routes that operate primarily on arterial streets, 20 limited-stop express routes (including four RAPID commuter express routes), six circulator and shuttle routes, and 11 demand-response services that provide door-to-door service on request. Most Valley Metro buses are equipped with electronic fare payment systems. All buses and most demand-response vehicles in the Valley Metro system are equipped with a state-of-the-art vehicle management system that includes a computer-aided dispatch system, vehicle location system with real-time information on bus locations, upgraded radios, and internal stop and public information announcement systems. Valley Metro is designing and building the State's first light-rail transit system, shown in Figure 7.7, and scheduled to open in late 2008. ADOT will perform an important safety and security role for the light-rail system, establishing program standards and guidelines through the Federal Transit Administration (FTA).

**Figure 7.7 Phoenix Approved Light-Rail System**



Source: Regional Public Transportation Authority.

Several municipalities, such as Glendale, Phoenix, and Tempe, operate circulator services in their central business districts. Arizona State University operates two shuttle routes

between its campuses. The Salt River Transit System provides rural-based route deviation transit services on three routes, and demand-response service in rural areas on the fringe of the Phoenix metropolitan area.

In Tucson the City operates SunTran with 28 fixed routes and nine limited-stop express routes. The City's VanTran operation provides demand-response service to persons with disabilities. The City also operates three circulator routes in the downtown Tucson area, known as Tucson Inner City Express Transit. The University of Arizona operates five CatTran shuttle routes in the vicinity of its Tucson campus. The Town of Oro Valley provides the CoyoteRun demand-response service for the elderly, disabled, and low-income population. Pima County operates fixed-route transit service in rural areas and Tribal communities surrounding Tucson and intercity service from Ajo into Tucson. In Tucson, a Transit Management System is integrated with other regional ITS, and includes automatic vehicle locator technology, as well as electronic fare collection systems on SunTran buses.

In Flagstaff, Coconino County operates four fixed routes supported by Federal transit grants, known as Mountain Line Transit. The County also operates the VanGo demand-response service for persons with disabilities, as well as for the general public when space is available. Northern Arizona University operates Mountain Campus Transit on four fixed routes on and near its campus.

The Yuma Metropolitan Planning Organization (YMPO) currently operates two fixed routes as Yuma County Area Transit (YCAT). These routes currently provide between six and eight round trips per day on the two routes. The YMPO also operates a demand-response service for persons with disabilities. These systems are also supported by Federal transit grants.

### ***Rural and Small Town Transit Services (Section 5311)***

Fourteen communities in rural areas and in small urban areas with populations under 50,000 provide transit services that are eligible for Federal funding under the ADOT Section 5311 program. Transit services in these areas generally operate less frequently and more flexibly than their counterparts in urban areas. Cottonwood, Lake Havasu City, and the Town of Miami provide door-to-door demand-response services with advance reservation. Bisbee, Coolidge, Sierra Vista, Kingman, Salt River Indian Community, Bullhead City, and Sunsites provide services on established routes that deviate on request to pick up or drop off customers at locations within a specified service area. The Hopi and Navajo Nations both provide service between cities on and around their reservations. The Show Low Transit System Four Seasons Connection and Pima County provide fixed-route service on two connected routes, one each in Show Low, Pinetop-Lakeside, and Hon Da Casino. In addition, the National Park Service operates free shuttles between parking areas and attractions in Grand Canyon National Park.

### ***Transportation for the Elderly and Disabled (Section 5310)***

More than 100 private non-profit and public agencies that provide transportation to the elderly and disabled are eligible for Federal funding for vehicle purchases under the ADOT Section 5310 program (see Figure 7.6 above).

### ***Intercity Passenger Bus***

Greyhound Lines provides the majority of long-distance bus service in Arizona, both in terms of destinations served and service frequency. Greyhound serves 48 communities, including the Phoenix Sky Harbor International Airport and the Benson and Tucson Amtrak stations. Most of its routes operate in interstate highway corridors, with the greatest service frequency in the I-10 corridor between Phoenix and Tucson (18 one-way trips per day).

In addition to Greyhound, five regional bus operators provide scheduled service, tours, and/or charters in Arizona. K-T Services operates shared route service with Greyhound between Phoenix and Las Vegas. Some rural transit operators in the ADOT-sponsored Section 5311 program, such as Hopi Senom Transit System, Navajo Transit System, Sunsites Transportation, and Pima County, provide scheduled service to major cities. Some tour companies, such as Gray Line Tours, operate scheduled tours to major attractions from larger cities.

## **Transit Demand and Utilization in Arizona**

Transit demand was estimated for most of the types of transit service described above. Because many demand-responsive transit systems do not record passenger boardings, it was not possible to estimate demand or utilization for these systems. The methods for estimating demand or future utilization for the remaining systems use a combination of historical data on transit ridership and existing methodologies employed in other states to develop estimates of transit demand and utilization. The detailed procedures required to estimate demand or future utilization for each type of transit are provided in Appendix F.

Urban bus ridership estimates were prepared by scaling the historical ridership data for MAG, PAG, and the Flagstaff Metropolitan Planning Organization (FMPO) regions. Because the urban bus service provided in YMPO was not operating when the MoveAZ Plan was completed, no forecast was prepared. A scaling factor was developed for 2025 from population and employment growth. In the MAG region, these forecasts were adjusted to reflect planned service expansion as described in the MAG RTP. Planned service expansion for the PAG region was already included in the existing ridership projections. The forecasts represent utilization of the existing or planned transit system. Predicted bus ridership in the four metropolitan regions is shown in Table 7.3.

**Table 7.3 Estimated Annual Urban Bus Ridership, 2002 and 2025**

County	2002	2025
MAG Region	43,524,000	67,101,000
PAG Region	15,925,000	27,015,000
FMPO Region	143,000	202,000
<b>Total</b>	<b>59,592,000</b>	<b>94,318,000</b>

Source: Cambridge Systematics, Inc., 2003.

Rural bus forecasts were based on population and employment growth, as well as on methodologies used in other similar planning efforts. Key statistics required to implement these approaches include annual revenue vehicle-miles (RVM); catchment area within the county; and population by age, mobility limitations, and income. Future transit studies conducted by ADOT and other agencies will provide an opportunity to update these demand estimates, and also improve upon the methods used to estimate transit demand in rural Arizona.

Intercity bus forecasts were estimated from existing planning methods used by the U.S. DOT's *Planning Techniques for Intercity Transportation Services Report*. This report estimates ridership of various lengths from round trip frequency, total population served along a route, and fare per mile. The forecasts do not reflect the potential for route deletions, schedule modifications, new service, or travel time changes due to highway congestion. Total estimates of rural and intercity bus ridership by county are shown in Table 7.4.

## ADOT's Role in Transit

ADOT administers two Federally-funded transit grant programs:

1. The Elderly and Persons with Disabilities Program (Section 5310) that provides nearly \$3 million annually to special needs transportation providers; and
2. The Rural Public Transportation Program (Section 5311) that provides up to \$4 million annually aimed primarily at 14 rural transportation providers.

In recent years, these programs were administered by the Transit Section of the Transportation Planning Division. In 2004, the Transit Section became a separate Public Transportation Division within ADOT. The Transit Division will have primary responsibility for conducting transit studies and working with municipalities and transit operators to ensure quality service and identify funding for transit programs in Arizona. The Transit Division will take responsibility for the 5310 and 5311 programs.

**Table 7.4 Estimated Daily Rural and Intercity Bus Ridership for 2002 and 2025**

County	Rural Bus		Intercity Bus	
	2002	2025	2002	2025
Apache	183	248	<1	<1
Cochise	278	428	<1	<1
Coconino	105	186	31	38
Gila	144	220	1	1
Graham	75	122	1	1
Greenlee	13	18	<1	<1
La Paz	58	102	2	2
Maricopa	393	789	495	685
Mohave	470	922	17	24
Navajo	247	381	2	2
Pima	787	1,404	94	117
Pinal	436	786	6	8
Santa Cruz	84	145	1	1
Yavapai	480	944	9	12
Yuma	366	661	15	21
<b>Total</b>	<b>4,119</b>	<b>7,356</b>	<b>674</b>	<b>913</b>

Source: Cambridge Systematics, Inc., 2003.

Over the last several years, the ADOT Transportation Board has approved \$1.5 million in Surface Transportation Program “Flex Funds” to address additional capital needs for Section 5310 agencies, and has approved \$5 million statewide for Rural Transit Programs (Section 5311) and Urban Transit Programs (Section 5307), or approximately \$1 million and \$4 million, respectively.

ADOT also supports transit through a variety of transportation planning efforts. All multimodal corridor profile studies and numerous small area transportation studies conducted by the Transportation Planning Division include an examination of transit needs in the region studied. MoveAZ included a detailed analysis of the extent of transit services and demand for transit, as shown in this chapter. In addition, the Transportation Board has adopted the MAG RTP as the official state plan for the MAG region. The RTP offers MAG a high degree of flexibility in funding its regional transit system.

In addition to identifying transit needs and alternatives in the multimodal corridor profiles, ADOT has also committed to examining public transportation needs in rural Arizona. ADOT intends to conduct rural transit needs analyses in each Council of Government area in the State. ADOT will also work with the Arizona Transit Association to ensure that transit representatives have the opportunity to participate on the Technical

Advisory Committees of studies conducted by the Transportation Planning Division, including multimodal corridor profiles, small area transportation studies, and modal studies, such as the transit studies described above and the State bicycle/pedestrian plan.

As described in Chapter 3, numerous participants at the public meetings identified transit funding as a major concern in the State. Current state law requires the Highway User Revenue Fund (funded from gas taxes and vehicle license fees) to be spent on highways. One clear suggestion raised by the Arizona Transit Association was to reestablish the Local Transportation Assistance Fund II (LTAF II). The original LTAF provided local funding assistance from lottery games and the state vehicle license fee. LTAF II was funded from the state general fund and was required, for most communities, to fund transit. Due to pressure on the general fund from the recent economic recession, funding through LTAF II has been limited since 2002. In 2000, \$30 million was provided to support transit in local areas through LTAF II. Reestablishing this funding mechanism for rural transit would help improve mobility in rural areas, especially for disadvantaged and mobility-challenged populations.

## ■ 7.4 Aviation

### Extent

As shown in Figure 7.8, there are 83 public-use airports in Arizona, 11 of which are certified to handle scheduled commercial air service. The remaining 72 airports provide general aviation and emergency response services. Another 236 airports across the State are private-use and accommodate airplanes, gliders, helicopters, and other forms of aviation.

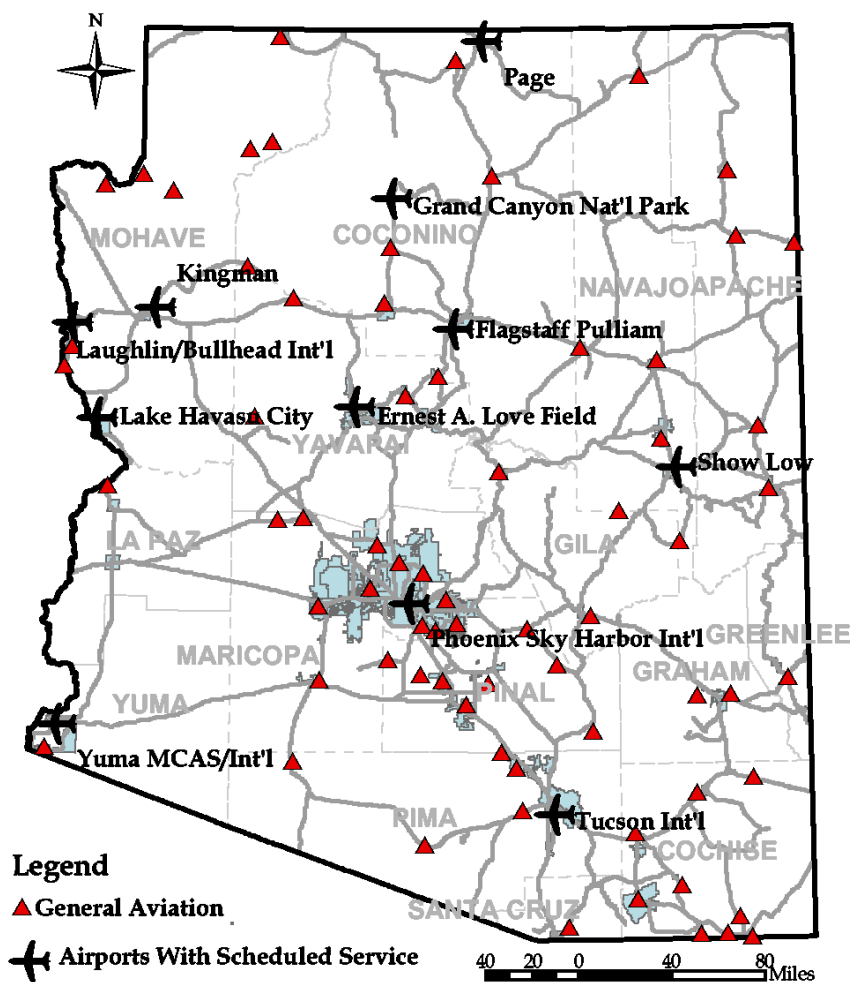
There were over four million take-offs and landings at Arizona airports in 2002, nearly 3.5 million of which were general aviation operations. Sky Harbor in Phoenix is the State's busiest commercial airport, with over 480,000 commercial take-offs and landings in 2002. Other airports with substantial commercial operations include Tucson International, Yuma International, and the Grand Canyon National Park airports. Sky Harbor and Tucson airports are qualified to handle cargo planes in addition to passenger planes.

### Aviation Demand in Arizona

Almost 21 million passenger enplanements were reported across 39 of Arizona's public-use airports in 2000, most at the Phoenix Sky Harbor and Tucson International Airports. Sky Harbor was the fifth busiest airport in the nation in 2001 in terms of operations, with over 550,000 take-offs and landings. Tucson was ranked 45<sup>th</sup>. As shown in Table 7.5, Grand Canyon National Park Airport and Laughlin/Bullhead International were the third and fourth busiest airports in the State in terms of passenger enplanements.



Figure 7.8 Aviation Network in Arizona



**Table 7.5 Airport Enplanements in Arizona, 2000**

<b>Airport</b>	<b>City</b>	<b>Enplanements</b>
Phoenix Sky Harbor International	Phoenix	17,568,900
Tucson International	Tucson	1,816,400
Grand Canyon National Park	Grand Canyon	411,400
Laughlin/Bullhead International	Bullhead City	75,000
Yuma International	Yuma	50,300
Flagstaff Pulliam	Flagstaff	33,400
Lake Havasu City	Lake Havasu City	8,600
Sierra Vista	Sierra Vista	6,100
Earnest A. Love Field	Prescott	4,700
Show Low Municipal	Show Low	2,900
Page Municipal	Page	2,100
Kingman	Kingman	1,700
<b>Total</b>		<b>19,981,500</b>

Source: Arizona Department of Transportation, 2002.

Between 1999 and 2000, passenger enplanements in Arizona rose overall. Though many major airports saw only modest increases over that period (enplanements at Denver International Airport increased by less than two percent, for example), Sky Harbor saw nearly an eight percent rise.

Commercial and general aviation enplanements were estimated and forecasted using a combination of the *2000 Arizona State Aviation Needs Study* and Federal Aviation Administration adjustments for the September 11<sup>th</sup>, 2001 terrorist attacks. Table 7.6 presents 2002 estimates and 2025 forecasts of daily commercial and general aviation air passenger enplanement forecasts by county.

## **ADOT's Role in Aviation**

ADOT owns a single airport, the Grand Canyon Airport. ADOT also has a separate division – Aeronautics – which is responsible for planning activities related to aviation. ADOT maintains an Aviation Fund that includes revenues from excise taxes on airplane fuel, aircraft license and registration fees, and other fees collected by the Aeronautics Division. This fund is dedicated to a variety of aviation projects across the State. The Aeronautics Division develops the State Aviation Plan, a parallel but independent process to MoveAZ. The State Aviation Plan identifies long-range aviation needs and planning in the State.

**Table 7.6 Estimated Daily Commercial Enplanements and General Aviation Operations by County**

County	Commercial Enplanements		General Aviation Operations	
	2002	2025	2002	2025
Apache			74	96
Cochise	23	51	310	366
Coconino	876	1,916	742	999
Gila			239	262
Graham	0	12	42	54
Greenlee			21	21
La Paz			39	49
Maricopa	41,717	91,191	5,212	8,089
Mohave	126	275	403	595
Navajo	5	22	220	267
Pima	4,660	10,186	1,217	1,581
Pinal			322	402
Santa Cruz			64	118
Yavapai	20	44	1,179	1,739
Yuma	165	361	109	145
<b>Total</b>	<b>47,592</b>	<b>104,058</b>	<b>10,193</b>	<b>14,783</b>

Source: Arizona Statewide Aviation Needs Study, 2000 and Cambridge Systematics, Inc., 2003.

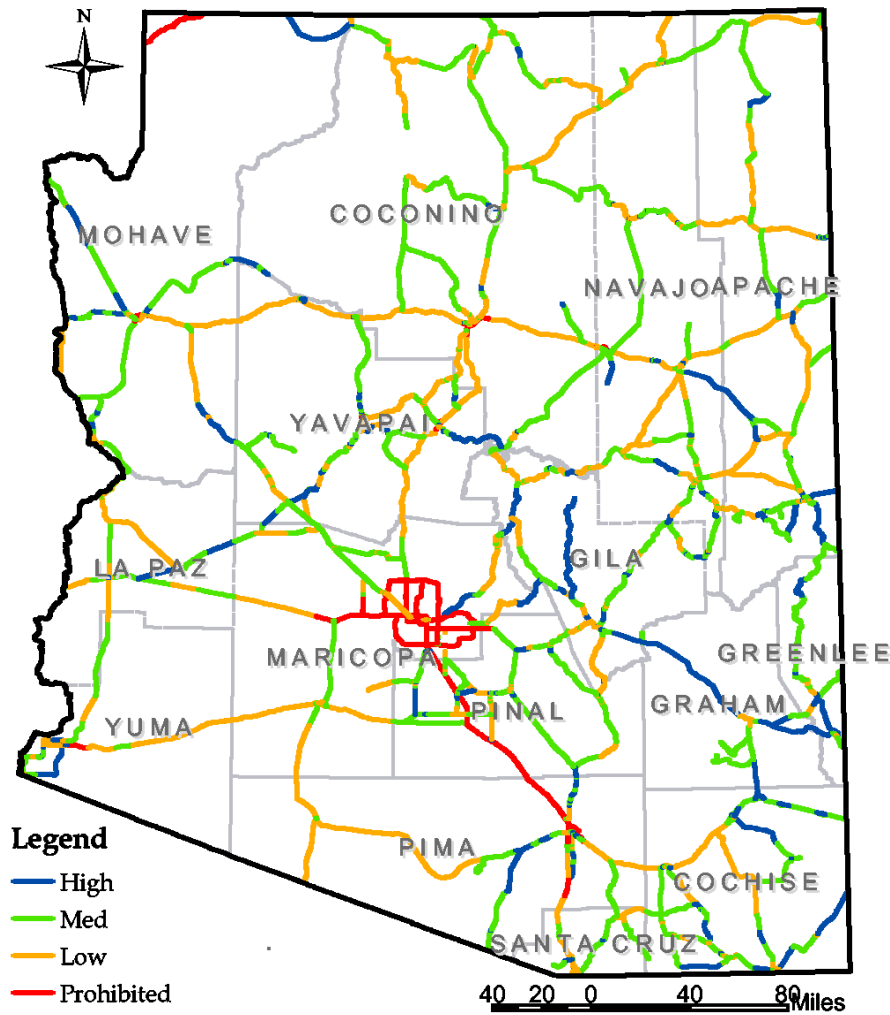
## ■ 7.5 Bicycle and Pedestrian

### Extent

As shown in Figure 7.9 and Table 7.7, over 3,000 miles of the Arizona state highway network – including interstates, U.S. routes, and state routes – are considered suitable for bicycle traffic. Bike suitability is a function of traffic congestion, roadway speed limit, shoulder width, and truck volumes. Using standards identified in the Arizona Bicycle/Pedestrian Plan recently completed by ADOT, nearly 60 percent of the state systems is of medium or high suitability. Individual metropolitan areas, such as Tucson, Phoenix, and Flagstaff, have their own bicycle networks as well. These networks include off-street

paths and trails, on-street bikeways delineated by painted white lines, signed on-street bike routes, and paved shoulders that can accommodate bicycles.

**Figure 7.9 Bicycle Network in Arizona**



**Table 7.7 Bicycle Suitability on the State Highway Network**

Category	Percent Suitable
High	15%
Med	43%
Low	34%
Unsuitable	7%

Nearly every trip made in the State has a pedestrian component. Though these are often short trips from parking spaces to final destination, providing for safe pedestrian traffic is clearly an important function of the transportation system. Except for some undivided highways, the state highway system is generally not intended for pedestrian traffic. Some of the highest pedestrian flows on state-owned facilities are at the ports of entry between Arizona and Mexico. As shown in Table 7.8, a total of 8.4 million people crossed the border on foot in 1999, with the heaviest volumes at Nogales and San Luis.

**Table 7.8 Arizona-Sonora Pedestrian Border Crossings, 2000**

<b>Port of Entry</b>	<b>Pedestrians Entering Arizona</b>
Douglas	705,000
Lukeville	78,600
Naco	64,700
Nogales	4,806,100
Sasabe	3,600
San Luis	2,721,600
<b>Total</b>	<b>8,379,600</b>

Source: Bureau of Transportation Statistics.

Regional and local governments across the State have examined pedestrian issues as part of their planning efforts. At the regional level, MAG has developed a pedestrian plan for the Phoenix region that identifies locations for pedestrian-friendly roadway design, based on the level of expected pedestrian activity in that area, the desired pedestrian level of service, and operational and design characteristics of roadways. The Tucson metropolitan area has shared-use paths, as well as sidewalks along most streets. Existing Tucson standards require four-foot wide sidewalks in residential developments and up to eight-foot wide sidewalks for commercial and industrial developments.

## Bicycle and Pedestrian Demand

Pedestrian and bicycle trips were estimated using data from the National Personal Transportation Survey, the Census Journey to Work, the FHWA, and the Bureau of Transportation Statistics. These estimates are for trips where the pedestrian portion or bicycle portion was the primary mode of travel for the trip. However, most trips include a pedestrian component, even when the primary mode of travel is the automobile. Table 7.9 presents estimates and forecasts of daily bicycle and pedestrian utilization by county for 2002 and 2025.

**Table 7.9 Estimated Daily Bicycle and Pedestrian Trips, 2002 and 2025**

County	Bicycle Trips		Pedestrian Trips	
	2002	2025	2002	2025
Apache	377	634	26,431	44,477
Cochise	3,991	6,401	35,580	57,063
Coconino	11,534	19,876	82,392	141,988
Gila	771	1,133	9,906	14,570
Graham	395	559	6,399	9,054
Greenlee	26	32	1,370	1,690
La Paz	729	1,227	7,626	12,836
Maricopa	200,779	331,412	498,001	822,014
Mohave	3,618	6,610	26,669	48,716
Navajo	288	479	9,161	15,209
Pima	72,656	106,416	164,007	240,215
Pinal	3,664	6,733	26,673	49,010
Santa Cruz	305	469	8,209	12,651
Yavapai	4,497	8,172	39,717	72,181
Yuma	6,715	10,947	34,261	55,859
<b>Total</b>	<b>310,345</b>	<b>501,100</b>	<b>976,402</b>	<b>1,597,533</b>

Note: Trips represent all purposes, but reflect primarily recreational trip making.

Source: Cambridge Systematics, Inc., 2003.

## ADOT's Role in Bicycle and Pedestrian Travel

Though ADOT does not provide specific facilities for cyclists or pedestrians on state highways, many of the improvements that ADOT makes can benefit these road users as well. For example, wider shoulders on state routes in small towns and rural areas provide a location for bicyclists to commute and recreate safely. Where state routes pass through towns and function as both a through highway and a local road, design standards require ADOT to develop facilities, such as sidewalks, that benefit pedestrians.

ADOT also supports bicycle and pedestrian travel through planning studies. The Transportation Planning Division of ADOT recently completed a state bicycle and pedestrian plan. One result of this plan was a measure of bicycle suitability that was adopted by MoveAZ as the bicycle suitability performance measure. ADOT can also participate in

the design and construction of transit passenger facilities, including pull outs and shelters on state routes that benefit both pedestrians and bicyclists.

## ■ 7.6 Summary

This chapter presented an overview of transportation modes in Arizona. Each of these modes is an important component of the overall transportation system in Arizona, and ADOT has significant and varied roles to play in the development and operation of each mode. Chapter 8 provides additional information on the transport of freight on these modes.

Several appendices provide additional detail regarding transportation modes in Arizona. Appendix A, the *Phase I Summary Report*, provides general background information on the extent of each mode of travel. This information was developed in 2002, and was updated for this Chapter. Appendix F, the *Demand and System Performance Analysis Technical Memorandum*, provides information on the demand for travel and the utilization of each of the modes. Appendix J, the *Goods Movement in Arizona Technical Memorandum*, provides additional detail regarding the freight system.